

Statement of Richard Moorer
Deputy Assistant Secretary for Technology Development
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
Before the
Subcommittee on Energy
Committee on Science
U.S. House of Representatives
November 2, 2005

Madame Chair, Members of the Subcommittee, I appreciate the opportunity to testify on the Solar Decathlon, a contest that originated in the Department of Energy's (DOE) Solar Technology Program.

History of the Solar Decathlon

In October 2000, DOE issued a challenge to our Nation's colleges and universities to design, build, and operate the most livable, energy-efficient, completely solar-powered house in a major competition. The Solar Decathlon houses had to provide all the home energy needs of a typical family of six using only the power of the sun. The winner of the competition would be the team that best blends aesthetics and modern conveniences with maximum energy production and optimal efficiency. The schools submitted proposals, and a committee of DOE and National Renewable Energy Laboratory experts in solar energy and energy efficient design selected 14 teams to compete in this contest.

The first Solar Decathlon took place from September 26 to October 6, 2002, on the National Mall in Washington, DC. Each team received \$5,000 in seed money from DOE. The university teams had to raise all their own funds to purchase materials, transport and build their house on the National Mall. The first event was well attended, with more than 100,000 people visiting the solar village on the Mall, eager to see the pioneering designs. Each team's home included a kitchen, living room, bedroom, bathroom, and home office space, with a maximum building footprint of 800 ft² (74.3 m²), equivalent to a small apartment. Though they shared these common requirements, the home designs for this first-ever Solar Decathlon varied widely, from traditional to contemporary. Beyond sophisticated energy systems, many homes were beautifully finished and furnished inside and out, with thoughtful integration of design aesthetics, consumer appeal, and comfort.

As the name implies, the Solar Decathlon is an event in which each team's performance is evaluated in 10 categories: architecture, dwelling, documentation, communications, comfort zone, appliances, hot water, lighting, energy balance, and getting around. There is a winner in each category, and an overall winner for the team that accumulates the most points. Each participating team invested a tremendous amount of time, money, passion, and creativity into this competition. Teams were composed of architects, engineers, designers, communicators, fundraisers, and builders. Some teams had to

overcome daunting obstacles, such as having to ship the entry from Puerto Rico by boat, or having a section of the home fall off the truck en route.

The overall winner of the 2002 competition, the University of Colorado, used a strategy of dependable technologies. Whereas the competition encouraged innovation, the limited duration of the event left little room for equipment failures or system malfunctions, which many other teams experienced. The Colorado team used a large (7.5 kW) photovoltaic (PV) array and designed the house well based on its understanding of the energy flows, having performed very comprehensive modeling of the home. The University of Virginia placed second, and Auburn University placed third overall in the competition.

A second competition was held in 2005. A request for proposals was issued in 2003, and 24 proposals were received. Twenty teams were selected, including a team from the University of Madrid in Spain and Concordia University in Canada. Each entrant then had two years to assemble a multidisciplinary team, raise all necessary funding, select and procure materials, and design and build their house on campus before transporting it to Washington, DC. Two of the original twenty, the University of Virginia and the University of Southern California, were unable to raise the necessary support and dropped out of the competition.

The 2005 Solar Decathlon was held from October 6-16. The 2005 designs had clearly improved over the 2002 designs. The attention to architectural detail, soundness of structural engineering, and integration of energy systems surpassed expectation and generated excitement to the over 120,000 visitors who walked through the village and toured the homes. Again, the University of Colorado took first place, followed by Cornell University in second place, and California Polytechnic State University finishing third.

Goals

There are two overarching goals of the competition. The first goal is to encourage young people to pursue careers in science and engineering and to acquaint college students in science, engineering and architecture with solar power and energy efficiency technologies. The contest encourages participating students to think creatively about the way we use our energy and to explore the benefits of using renewable energy and energy efficiency technologies to help maintain our lifestyles.

The Solar Decathlon has attracted students to learn about solar energy and energy efficiency. Some of the schools recruited 50 or more students to join their Solar Decathlon teams. Many of the students received credit for their work in addition to gaining valuable hands-on learning. The students also gain valuable experience to help them find jobs after graduation in the fields of energy research, engineering, or design.

The second overarching goal is to encourage consumers to use solar energy and energy efficiency technologies. Off-the-shelf solar technology is ready today to provide power

for homes, and energy efficiency technologies available at your local hardware store can significantly reduce the energy homes use. Consumers can tour the homes and take part in workshops at the Solar Decathlon to learn what they can do to tap solar power or reduce energy use in their own homes.

The Solar Decathlon appears to be a good way to promote outreach. Over 120,000 visitors toured the houses this year and learned from the students how the houses were designed and what technologies were incorporated. All the teams told their visitors about easy ways to save energy, such as using compact fluorescent lights and Energy Star appliances. The public also learned about solar energy systems, radiant floor heating, day lighting schemes and new building materials such as structural insulated panels (SIPs).

To help educate builders, architects, and other professionals in the housing industry, DOE, together with its sponsors, organized a “building industry day.” Builders and architects were invited to come to the Solar Decathlon on Friday, October 7th for workshops and guided tours specially designed to encourage technology transfer. Many of the workshops were full to capacity with standing room only.

2007 and Beyond

The Department believes that the 2002 and 2005 Solar Decathlons advanced the two overarching goals described above. As a result, Department plans to hold successive events every two years, with the next event in 2007, subject to available funding.

Based on lessons learned, DOE is going to make three major improvements to the Solar Decathlon: 1) tie the competition more closely to DOE’s solar program goals by placing greater emphasis on system integration and cost effectiveness, 2) improve public outreach to communicate the benefits of these technologies to a wider audience, and 3) provide increased federal funding to enable the teams to design and develop more cost-competitive structures.

The Department believes that competitions such as the Solar Decathlon maximize creativity and innovation, and generate strong motivation and interest. The Solar Decathlon may also foster the technology transfer process. The competition provides the opportunity for aspiring young architects and engineers to be creative, innovative, and design and develop new ideas. The empty lot provides a place to build, to test, and to learn what works best.

Subject to available funding, DOE intends the Solar Decathlon to become a ten-year, biennial effort to design appealing, energy efficient, cost-competitive solar houses for all household energy needs: heat and electricity. In addition, we hope to encourage a fully developed and refined set of design and cost specifications for the houses, an industry better prepared to produce and build similar designs, and an educated public ready to accept them.

DOE conducted a survey of the participating 2005 Solar Decathlon teams. Most teams struggled to raise funds over the past three years since the first event was held, with two dropping out due to lack of support. In response, Secretary Bodman announced that the Department would increase its financial support for the 20 best proposals selected through a competitive process from \$5k to \$50K per year over two years, subject to available funding.

Technology Transfer

The Solar Decathlon is specifically designed to help teams integrate solar energy and energy efficient building technologies and practices into their designs. This was accomplished by fully involving DOE's Solar Program and Building Technologies program in Solar Decathlon team activities including materials development, pre-competition meetings, and contest design. In addition, the inclusion of sponsors like the American Institute of Architects and BP Solar was intended to significantly improve outreach capability with professional builders, architects and solar equipment manufacturers in the U.S.

Specific Solar Decathlon activities were designed to foster technology transfer by appealing to builders and/or to consumers intending to build or renovate their homes using solar and/or energy efficiency technologies. These included:

- Building Industry Day on October 7. Builders and allied trades from the Washington Metropolitan area, as well as seven nearby states, were invited to participate in a special day set aside for builder-oriented tours of the homes and a series of technical workshops designed to help them understand how best to use and install energy efficient products and solar technologies in building projects.
- A series of workshops geared for the general public was held every day from October 8 - 16 to encourage the installation and use of energy efficiency and solar energy technologies. The workshops were designed to help consumers understand how to go about installing these technologies in their homes in order to reduce their use of energy.
- A concerted media outreach campaign about the Solar Decathlon was undertaken to provide in-depth information about the competition and about energy efficiency and renewable energy technologies. The resulting (and continuing) media coverage has helped the public understand that energy efficiency and solar energy technologies are available off-the-shelf today and, when installed, can significantly reduce home energy use.
- A product directory, searchable both by team and by product type (windows, appliances, solar panels, etc.), is prominently featured on the Solar Decathlon web site home page. The product directory is designed to help people locate the products and technologies featured in each of the Solar Decathlon homes.

- "The Anatomy of a House" educational exhibit was developed to help builders and the public understand individual energy efficiency and solar energy technologies (windows, insulation, solar hot water technology, etc.) and how they work under the "skin" of a house. Also included in this exhibit was an interactive display explaining how net metering works in a home using a photovoltaic system connected to the utility grid.

And, finally, an unanticipated way in which these technologies can be moved into the marketplace is through the students themselves. Several builders and businessmen, impressed by the skills and knowledge of the Solar Decathlon students, were actively recruiting them for jobs.

Madame Chair, that completes my prepared statement, and I would be happy to answer any questions the Subcommittee might have.